C-DOT 256P AN-RAX (ISDN)

USER MANUAL

System Practices

Section No. 356-027-0918

Draft 01, May 2005

C-DOT 256P AN-RAX (ISDN)

USER MANUAL

© 2005, C-DOT
Printed in India

C-DOT 256P AN-RAX (ISDN)

USER MANUAL

DRAFT 01

MAY 2005

JYAISTHA 2062

SERIES 000 : OVERVIEW

CSP SECTION NO. 356-027-0918

THIS C–DOT SYSTEM PRACTICE REFERS TO THE C–DOT ACCESS NETWORK 256 PORT RURAL AUTOMATIC EXCHANGE [ABBREVIATED AS C–DOT AN-RAX (256P) IN THE REST OF THIS PUBLICATION].

THE INFORMATION IN THIS SYSTEM PRACTICE IS FOR INFORMATION PURPOSES AND IS SUBJECT TO CHANGE WITHOUT NOTICE.

A COMMENT FORM HAS BEEN INCLUDED AT THE END OF THIS PUBLICATION FOR READER'S COMMENTS. IF THE FORM HAS BEEN USED, COMMENTS MAY BE ADDRESSED TO THE DIRECTOR (C & S), CENTRE FOR DEVELOPMENT OF TELEMATICS, C-DOT CAMPUS, MEHRAULI, NEW DELHI - 110 030

© 2005 BY C–DOT, NEW DELHI.

Table of Contents

Chapter 1. Introduction 5

1.1. The Document 5

1.2. ISDN 5

1.3. System Overview 6

Chapter 2. Specifications and Capacity 8

2.1. Capacity 8

2.2. Interface Towards Local Exchange (LE) 9

2.3. Interface Towards the Subscribers 9

2.4. Powering Option 9

2.5. Limitations 9

Chapter 3. System Architecture 10

3.1. Compact ISDN Terminal Unit (CIT) 10

3.2. Hardware Architecture 12

3.3. Software Architecture 12

Chapter 4. Conversion and Retrofit Procedure 15

4.1. Conversion of 256P RAX TO C-DOT 256P AN RAX (ISDN) 15

4.2. Conversin of C-DOT AN-RAX (256P) TO C-DOT 256P AN RAX (ISDN) 15

4.3. Procedure of Conversion 15

4.4. Cables Used in AN RAX (ISDN) 19

Chapter 5. Man-Machine Interface (MMI) and Alarm Monitoring 34

5.1. Description of New Parameters 34

5.2. Description of ISDN Related Commands for ANRAX 38

Chapter 1.

Introduction

1.1. THE DOCUMENT

This document provides a general description of ISDN BRI interface provisioning on 256P AN RAX. The feature is explained in terms of the hardware system overview, capacity modifications in ANRAX cards & system Engineering to support ISDN, software architecture design, Man-machine commands & display. It also provides information regarding the implementation of ISDN feature in the existing ANRAX and C-DOT 256P RAX. The procedure to implement ISDN feature in C-DOT 256P AN RAX and C-DOT 256P RAX is given in Chapter IV..

1.2. ISDN

1.2.1. Overview

An Integrated services Digital Network (ISDN) is a type of communication network that transports voice, data, text and image information in digital form between network access points.

ISDN provides digital end to end connectivity which means that terminals and subscribers lines are digital. Digital communication offers a safer and a more flexible transfer of information than analogue communication. ISDN supports a wide range of services covering all the telecommunication services today and also new services for the future.

At present there are dedicated networks for the transport of voice and various forms of data. Subscribers needs separate accesses for different networks and services like Videotext, Telephone, facsimile, Computer, Telex etc. ISDN gives the subscriber combined or integrated access to these services. The integrated access implies that an ISDN customer has access to both voice and non-voice services through or single subscriber line. These services, in some cases depending on terminal type, are available to the subscriber at a single terminal.

The access has a number of time multiplexed communication channels and a separate channel for signalling.

1.2.2. User Network Accesses

There are two types of user-network accesses. These are adapted to specific traffic load situations with a defined maximum number of communication channels.

Basic Rate Access (BRA)

A basic rate access is used for a low traffic load. It normally includes one signalling channel (D) and two communication channels (B). An example of a subscriber connected via basic rate access is a private home or a small business. The BRA uses the common 2-wire subscriber line.

Primary Rate Access (PRA)

A primary rate access can handle a higher traffic load than the basic rate access. An ISPBX and IMUX are two example of devices which can be connected to a PRA.

Bit Rates

The B-channels have a bit rate of 64 kbits/sec., whereas there are two bit rates implemented for the D-channel.

When the D-channel used as a signalling channel for a basic rate access, 16 kbits/sec. is enough to handle the signalling information for the two B-channels and a limited amount of user-to-user information.

A primary rate access can contain up to 30 B-channels and consequently requires a higher capacity for signalling. The D-channel for a primary rate access has a bit rate of 64 kbit/s. Both D and B-channels are full duplex channels.

1.3. SYSTEM OVERVIEW

The implementation of ISDN feature in the 256P ANRAX will provide the concentration for maximum 15 ISDN subscribers through V5.2 Interface. The system supports only BRI interface provisioning thus devices like ISPBX and IMUX cannot be connected to the ANRAX, which needs PRI interface provisioning.

ISDN connectivity in 256P ANRAX is achieved by adding one small unit CIT (Compact ISDN Unit), other than master & slave, which is controlled by the ARC card present in the existing ANRAX. The existing hardware and software is reused with minor modifications (Cut & straps) on the ARC card. This unit can be housed on top of the ANRAX system cabinet Fig.1.1.

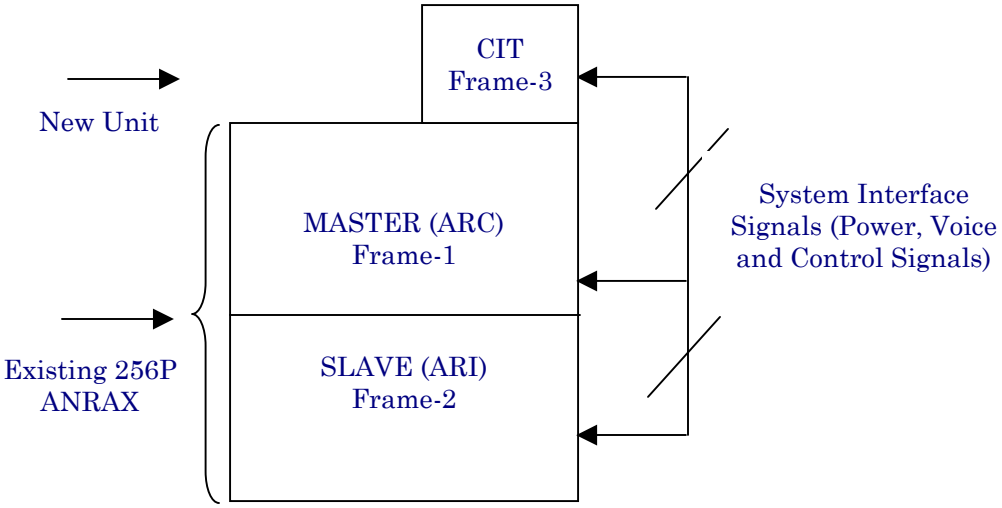


Fig. 1.1
Block Diagram of ANRAX with CIT Cabinet

The product supports all three level remotting. Call processing, charging, billing, traffic monitoring and switching are performed at LE, whereas ANRAX plays the role of front end termination for both PSTN and ISDN subscribers at remote end.

Chapter 2.

Specifications and Capacity

ANRAX (ISDN) supports 2E1 links (60 bearer channels) towards LE on V5.

2.1. CAPACITY

The system supports two modes of operation -

- In PSTN+ISDN mode, it supports upto 15 ISDN BRI subscriber interfaces. The PSTN subscribers in this configuration are 216.
- In PSTN mode, it supports 248 PSTN subscriber interfaces.

The number of bearer channels towards the local exchange remains unchanged as 60 (Two E1 links).

Mapping of L3-Addresses and EF-Addresses for subscribers

L3 Address - L3 address is an address within layer 3 messages. It's purpose is to uniquely identify a PSTN user port or subscriber within a V5.2 Interface.

EF-Address - (Envelop Function Address) EF-address in an address used to uniquely identify different ISDN D-channel messages of the ISDN user port, which are frame relayed on to the V5.2 communication channel. In other words it's purpose is to uniquely identify an ISDN user port within a V5.2 Interface.

In 256P ANRAX if the third frame CIT is not provisioned then the L3 address mapping remain as described in the user manual for 256P ANRAX.

In case ISDN 3rd frame CCIT unit is present then,

- Port numbers 224 to 255 is mapped to ISDN timeslots from BRL cards of third frame.
- The L3 addresses for PSTN subscriber will range from 0 to 223, where 0 is the start LE address.
- The value of the starting EF address is always fixed with respect to starting L3 address and the value will be equal to start L3 address + 225, which is the EF address of first ISDN port.

- The EF address for ISDN subscribers will range from 225 to 231 for first BRl card, 240 to 247 for second BRL card and the L3 addresses 232 to 239 and 248 to 255 remain blocked.
- Since port no. 224 is used as a communication channel between ARC and BRLs, the first port of the first BRL card will not available. Thus 7 ports (from port no. 2 to port no.8) of first BRL card and 8 ports of second BRL card will be available for ISDN user.

2.2. INTERFACE TOWARDS LOCAL EXCHANGE (LE)

This remains unchanged as reference to User Manual for 256P ANRAX.

2.3. INTERFACE TOWARDS THE SUBSCRIBERS

The BRL cards (used in C-DOT MAX products) are used to provide ISDN BRI (2B+D) connection for ISDN subscribers. Each BRL card supports eight subscribers. Two BRL cards are equipped in the systems, to provide connectivity to 15 ISDN subscribers. One of the timeslots in the TDM bus between the BRL cards and the controllers is used to carry the messages. Hence only 15 ISDN subscribers are supported. Provision for PSTN subscribers interface remain unchanged except subscriber on the slots nos. 21 to 24 (TG#8) of the slave frame which has been used for ISDN subscribers.

2.4. POWERING OPTION

Power is derived from nominal -48V DC.

2.5. LIMITATIONS

- In 128P mode, no ISDN subscriber can be supported.
- 15 ISDN subscribers are supported at the expense of 32 PSTN subscribers.

Chapter 3.

System Architecture

The major change in the system architecture is the addition of a Compact ISDN Unit (CIT) cabinet to support ISDN BRI Interface the basic block diagrams for the system is shown in Fig. 3.1.

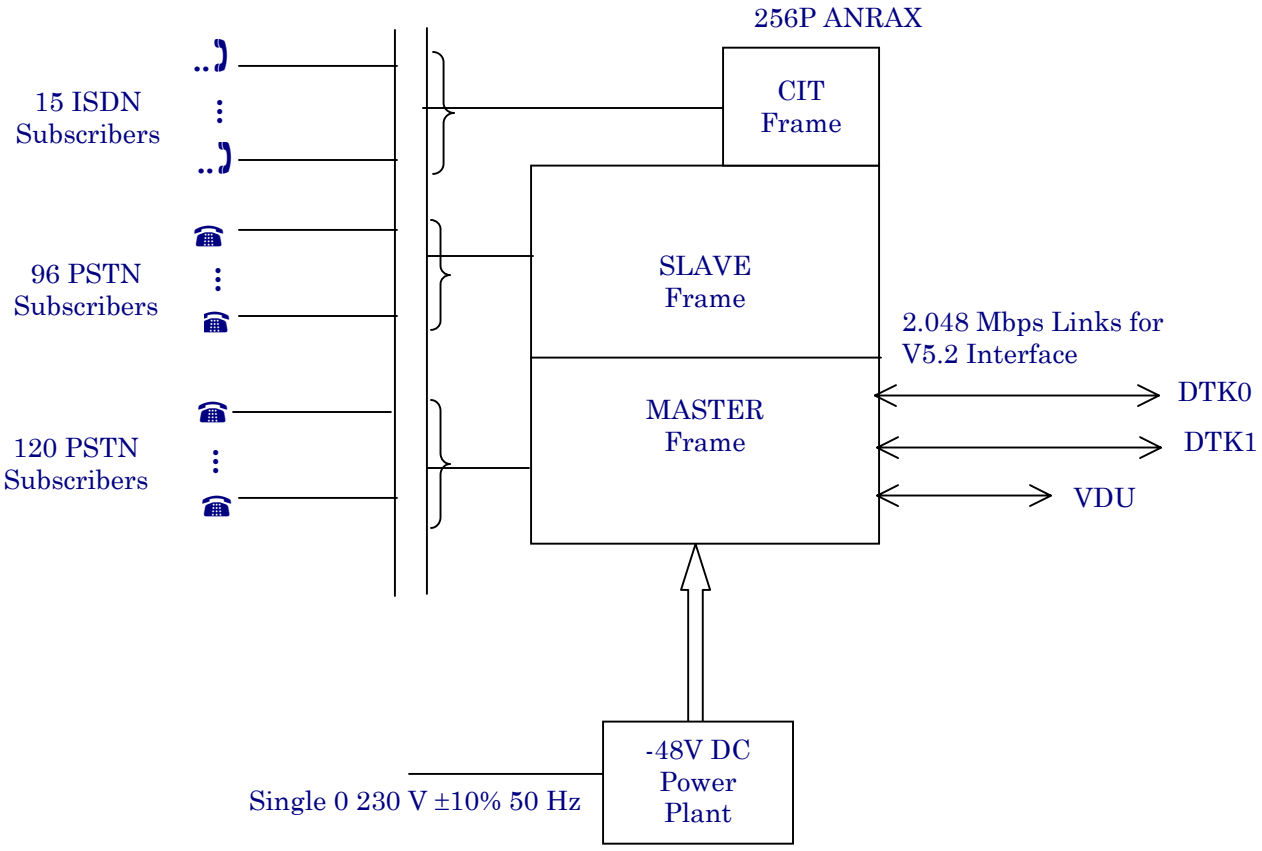


Fig. 3.1

Simplified System Architecture of 256P ANRAX with ISDN Unit

3.1. COMPACT ISDN TERMINAL UNIT (CIT)

The external Compact ISDN Unit (CIT) houses one Power Unit (EPU), two ISDN Terminal Unit Interface (ITI cards and two BRL cards. The Cabinet has 13 available slots for the future enhancement in capacity. The BRL cards are interfaced to the main controller, i.e., ARC card, through ITI cards whose functions

are similar to the ARI cards in the slave frame of ANRAX. The ITI cards are defined by making minor modifications on the ARI cards.

A 2 Mbps digital link of TG#8 (Terminal Group) of the slave frame is used for the communication between ARC and BRL cards.

The onward TG Link#8 and the control signals (clock, sync) are extended to the ITI cards from ARC. The return TG Link#8 from the ITI cards reaches ARC card. The first PCM time slot of the above link carry messages between BRL cards and ARC card for supporting ISDN protocol oner V5.2 Interface as shown in Fig. 3.2.

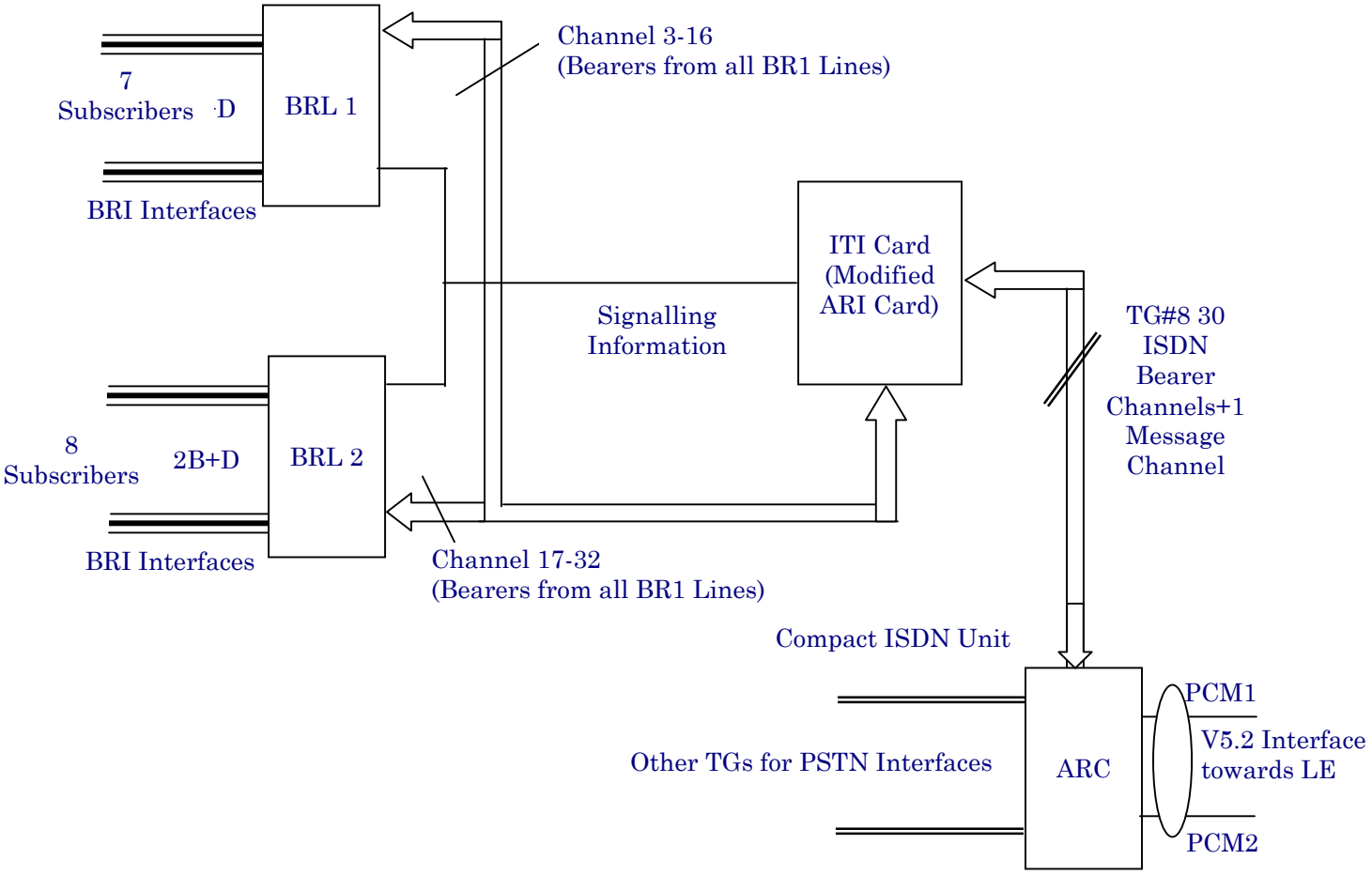


Fig. 3.2

3.2. HARDWARE ARCHITECTURE

There is no major charge in the H/W Architecture of the ARC and ARI cards.

3.2.1. Configuration

Apart from existing AN-RAX the distribution of cards for compact ISDN unit is as follows -

ISDN Terminal Unit Interface (ITI) card = 2 nos.

Basic Rate Line (BRL) cards = 2 nos.

Power Supply cards = 1 no.

3.2.2. ANRAX Controller Card

The minor changes on the existing ARC S01 card are two cut and three straps.

These changes are required to use the SCC3 of the Master IMP of the ARC card for both MMI and debug purpose. Previously Master IMP was used only for MMI commands and slave IMP was used for debug purpose.

The SCC3 of the slave IMP is used for handling BRL card messages.

3.2.3. Basic Rate Line Card (BRL)

BRL cards in the CIT cabinet of ANRAX are already working in the C-DOT MAX, can be used by removing or modifying some portions which are not required for ANRAX.

Both BRL cards communicate to the ARC card with a 2 Mbps. PCM link through ITI card. The ISDN subscriber interfaces are directly tapped from the back panel of BRL cards.

3.2.4. ITI Cards

ITI is a modified version of AR1. Its functions and architecture is same as for ARI card.

3.3. SOFTWARE ARCHITECTURE

There is no major change in software architecture of the existing ANRAX. And the approach was to reuse the all existing software of ANRAX.

Modified Software Entities for ISDN on ANRAX are as follows -

3.3.1. V5 Modules

3.3.1.1. Enhanced Control Protocol (CP)

The CP protocol module has been enhanced to take care of the BRL port activation and deactivation procedures. Now this process supports the following message :

a) FE 101 (activate access)

b) FE 102(activation initiated by user)

c) FE 104 (access activated)

d) FE 105 (deactivate access)

e) FE 106 (access deactivated)

f) FE 207 (D-Channel block)

g) FE 208 (D-Channel unblock)

3.3.1.2. Enhanced BCC

The BCC protocol module can now support the ISDN channel identification (2B) and multi slot connections.

3.3.2. An Modules

3.3.2.1. Maintenance Software (FST)

The software now monitors the links towards the BRL cards also. This entity informs OAT to update the Alarm panel for BRL card status. It blocks and unblocks the ISDN ports upon jack-out and jack-in of the BRL cards.

3.3.2.2. Non-Machine Interface (OAT)

Now commands have been added to OAT to equip the BRL cards. The port related commands have been extended to ISDN ports.

3.3.2.3. IPCP Layers

The IPCP now handles two separate two separate data links for the two BRL cards for the transfer of maintenance messages and the port activation and deactivation interface.

3.3.2.4. Frame Relay Functionality in IPCP Layers

The D-channel messages are frame relayed to LE on the Active Link by IPCP layers after performing some required basic checks.

3.3.2.5. Data Base Task (DBT)

The ANRAX database is enhanced to handle 2 new types of units BRL and ITI.

3.3.3. BRL Card Software

This software is built in the lines of the ISTU BRL software. The software has the following processes.

3.3.3.1. Basic Rate Physical Handler (BRPH)

This process handles the activation and de-activation of the ISDN ports and also any error indication from the ISDN ports.

3.3.3.2. Basic Rate Rx Handler (BRRx)

Basic Rate Rx Handler (BRTx)

These processes act as the driver processes for receiving and sending D-channel messages to the ISDN equipment from the BRL card.

3.3.3.3. Layer 1 Frame Handler (L1FH)

This process acts as the gatekeeper for allowing flow of signalling messages towards ARC from BRL card. It interfaces with Control Protocol of ARC to control the ISDN ports.

3.3.3.4. IPCP Process for Communication to ARC Card (SCCT, DLCT, DLPT)

These are used to maintain the LAPD link between the ARC and BRL cards for transfer of Maintenance messages and the D-channel messages.

Chapter 4.

Conversion and Retrofit Procedure

4.1. CONVERSION OF 256P RAX TO C-DOT 256P AN RAX (ISDN)

In order to convert C-DOT 256P RAX into C-DOT 256P AN RAX (ISDN), first 256P RAX is to be converted to 256P AN RAX. The broad guidelines for conversion of 256P RAX to 256P AN RAX are as under

- Switch off C-DOT 256P RAX.
- Cards which are not required in C-DOT 256P AN RAX are to be removed.
- The Cable which are not required in C-DOT 256P AN RAX are to be removed.
- The motherboard is to be modified by putting straps as required for the conversion from 256P RAX to 256P AN RAX.
- Pre-charge pins are to be placed in slots where ARC and ARI are to be put.
- New cards & cables which are required in AN RAX are to be put in the system.

Note: Please refer to Chapter 6 of USER MANUAL of C-DOT AN-RAX (256P) for details of above guidelines.

To make it AN RAX (ISDN), follow the guidelines as given below.

4.2. CONVERSIN OF C-DOT AN-RAX (256P) TO C-DOT 256P AN RAX (ISDN)

ISDN implementation on C-DOT AN-RAX (256P) require -

1. Equipped compact ISDN TU
2. Existing AN-RAX system having relevant software.
3. Cables as given is section 4.4.
4. The 250 mA slow flow fuse (FH3) at MP power point in PDP will be changed to 6.3A slow blow.

4.3. PROCEDURE OF CONVERSION

1. Switch off the power supply of 256P RAX/256 P AN RAX.

2. Take out ARC cards and make two cuts and three straps

   Details of Cut & straps on ARC are -

   Cut C1 → cut trace fro U38/7 to K6/4 on solder side

   Cut C2 → cut trace from Ba20 to RN43/5 on solder side

   Strap S1 → strap Ba28 to K6/4

   Strap S2 → strap K6/9 to Bc28

   Strap S3 → strap RN43/5 to RN43/10

3. Put relevant PROMs on U20 & U60 location of ARC and put back ARC's and front flat cable.(Refer section 4.3.1 for checksum)

4. Remove Interframe cables IFC0, IFC1, IFC2, IFC3. Use cables as given in Table 4.4.1 place them as give in Table 4.4.2.

5. Change 250 mA slow blow fuse (FH3) at Mp power point on PDP on AN-RAX to 6.3 A slow blow.

6. Insert cards in AN-RAX and CIT as given in H/W configuration of AN-RAX (ISDN), section 4.3.2.

7. Switch on AN-RAX and CIT power supply. C-DOT logo shall appear on Dumb terminal.

8. Give password and make both the DTK OOS by giving frc-dtk-OOS command.

9. Note down the AI characteristics by giving command displ-ai-char.

10. Give init-sys command and boot using default data by giving Boot level as 2.

11. Delete ai by giving command del-ai.

12. Create AN interface by giving cre-ai command. Parameters in cre-ai should match with the parameters defined at LE.

13. Select PSTN only or PSTN+ISDN mode by giving command mode-sys-mode.

14. Unequip LCC cards from slot-No 21, 22, 23, 24 of frame 2 (slave) if PSTN + ISDN mode is selected.

15. Equip slot No. 1 & 2 of frame 3 for Brl using equip-slot command.

16. Make DTK in service by using put-dtk-ins command.

17. Give start-ai command to bring up the interface.

4.3.1. H/W and S/W Status of C-DOT 256 Port AN-RAX (ISDN)

The hardware and software status of C-DOT 256 port AN-RAX (ISDN) is as under.

Hardware Status of C-DOT 256 Port AN-RAX (ISDN)

Master Frame

Sl.No.	Card Name	Part Code	Card Description
1.	ARC	APC-ARCA62/O-S01	AN-RAX controller card
2.	SPC/ISP	APC-SPC001/T-S06 APC-ISP867/T-S02 APC-ISP867/T-S03	Signalling processor card/Integrated Signalling Processor Card
3.	LCC	APC-LCC037/T-S08	Line Circuit Card
4.	CCM	APC-CCM241/T-A00	Coin Collection Box with 16KHz Metering Card
5.	RTC	APC-RTC327/T-S02	RAX Terminal Tester Card
6.	PSU	APC-PSU036/T-A09	Power Supply Card

Slave Frame

Sl.No.	Card Name	Part Code	Card Description
1.	ARI	APC-ARIE11/T-S00	AN-RAX Interface card
2.	SPC/ISP	APC-SPC001/T-S06 APC-ISP867/T-S02 APC-ISP867/T-S03	Signalling processor card/Integrated Signalling Processor Card
3.	LCC	APC-LCC037/T-S08	Line Circuit Card
4.	CCM	APC-CCM241/T-A00	Coin Collection Box with 16KHz Metering Card
5.	PSU	APC-PSU036/T-A09	Power Supply Card

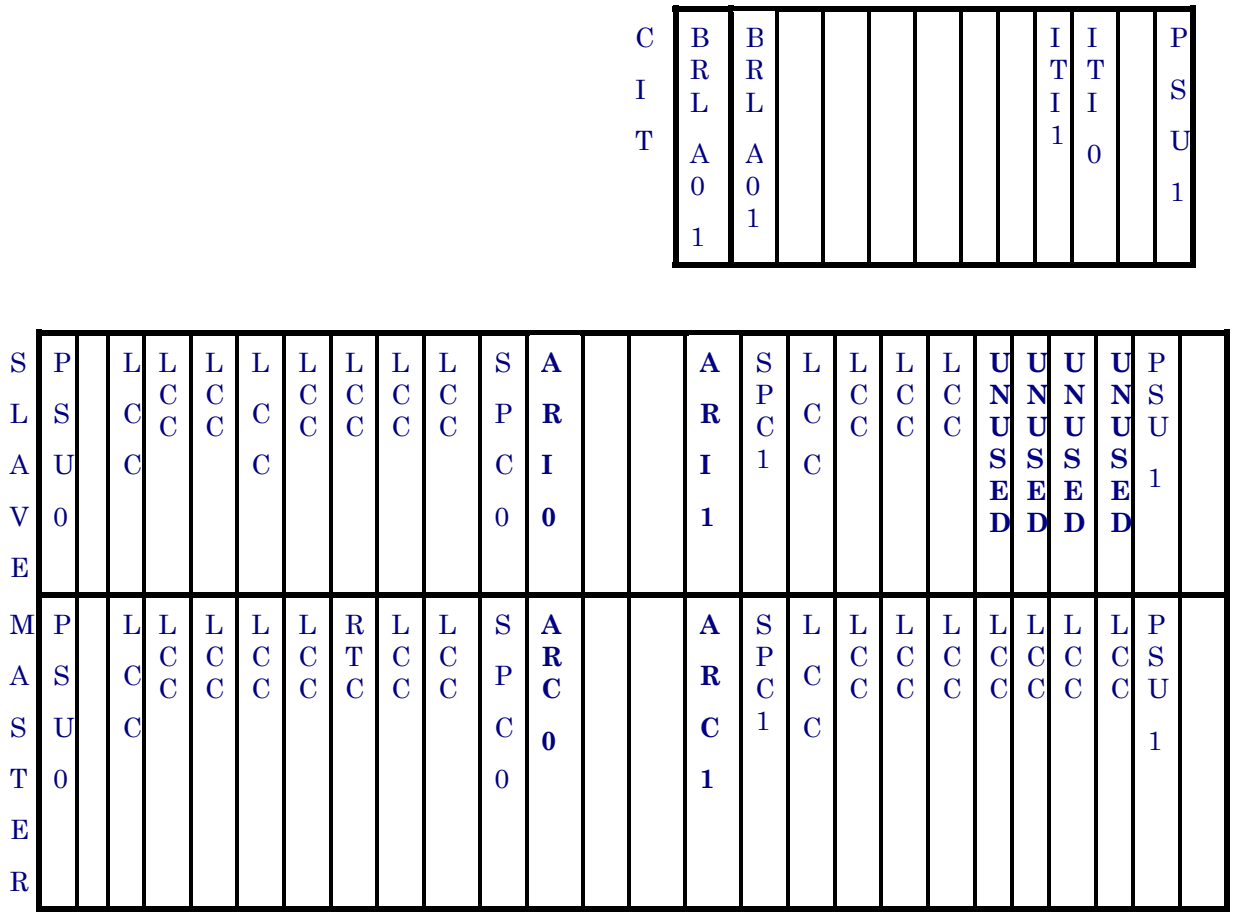
Compact ISDN TU (CIT)

Sl.No.	Card Name	Part Code	Card Description
1.	BRL	APC-BRL537/H-A01	Basic Rate Line Card
2.	ITI	APC-ARIE11/T-A00	AN-RAX Interface Card (ITI)
3.	PSU	APC-PSU036/T-A09	Power Supply Card

Software Status of C-DOT 256 Port AN-RAX (ISDN)

Sl.No.	Card Name	Part Code	EPROM Type	Position	Checksum
1.	ARC	APC-ARCA62/O-S01	27c801 27c801	U20 (H) U2 (L)	E0A6 5EFC
2.	BRL	APC-BRL537/H-A01	27c040 27c040	U50 U60	0245 3873
3.	RTC	APC-RTC327/T-S02	27c256	U5	A8DE

4.3.2. H/W Configurations AN-RAX (ISDN)



The above Setup shows CIT cabinet placed over the AN-RAX system. ITI (ARI-A00) card acts as an extension of ARC card in the ISDN frame. Voice/Data signal and the signaling information are exchanged between ITI card and the ARC card through the Interframe PCM cables extended to CIT frame.

Changes required in the existing AN- RAX system to support ISDN on AN-RAX

I. Cards to be removed

#	Card	Qty	Remarks
	Line Connecting Card (LCC)	4	Slot No 21 to 24 should be empty in slave frame. ITI card & BRL card in CIT frame will use the PCM link of these four LCCs.

II. Cards to be added

#	Card	Qty	Remarks
1.	ISDN TU Interface card (ARI-A00) or ITI	2	ARI-A00 card will occupy slots 9 & 10 of CIT frame
2.	Basic Rate Interface Line card (BRL-A01)	2*	BRL-A01 card will occupy slots 1 & 2 of Slave frame
3.	Power Supply Card (PSU-A09)	1	PSU-A09 card will occupy slot 12 of CIT frame

**** Note:*** BRL card quantity depends on the number of BRI subscribers needed. Max 2 BRL can be used.

4.4. CABLES USED IN AN RAX (ISDN)

4.4.1. Cables used in C-DOT 256P AN RAX (ISDN) are given in Table 4.4.1.

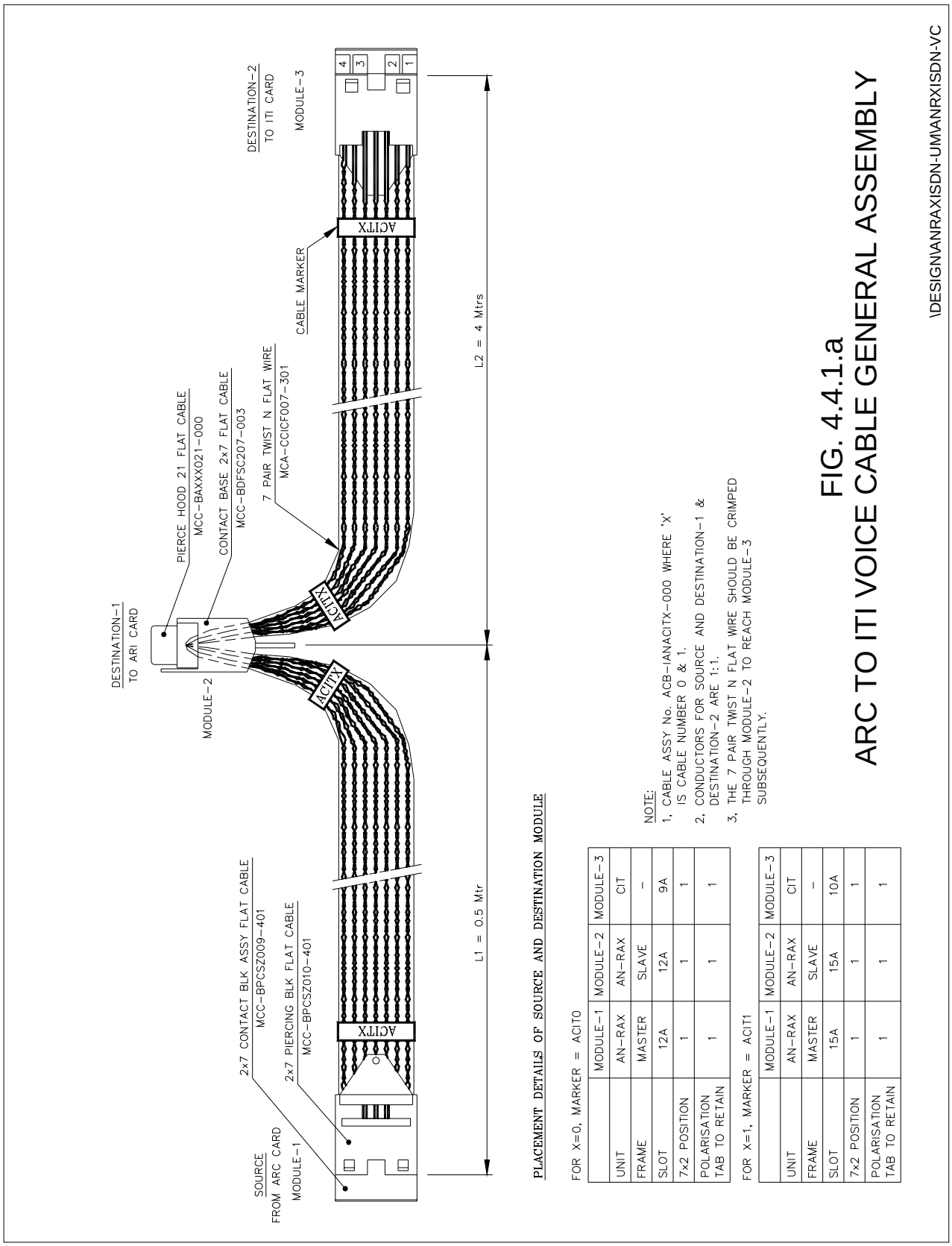
4.4.2. Cable Placement in given in Table 4.4.2

Routing of the cable in shown in Figure 3.3.2a, 4.4.2b and 4.4.2.c.

Table 4.4.1

SL. NO	Cable type	Qty	Remarks	Marker	Fig.
1.	ARC to ITI voice cable	2	Extend PCM out of ARC to PCM in of ARI and ITI	ACIT0/ ACIT1	4.4.1.a
2.	ARI to CIT voice cable	2	Extend PCM out of ARI to CIT for muxing	AICI0 AICI1	4.4.1.b
3.	ARI to ITI Active/Passive cable	1	Extend Active/Passive signal of ARI to	AIITX	4.4.1c
4.	ITI to ARC voice cable	2	Extend ITI PCM out/ARI PCM out to ARC	ITAC0 ITAC1	4.4.1d
5.	RAX PDP to CIT power	1	Extend 48V & 48VGND	PD.1X0	4.4.1e

	cable		from RAX PDP to CIT		
6.	CIT Protection ground cable	1	Extend CIT Protection ground cable to Exchange Earth bar	ABEB	4.4.1f
7.	PSTN MUX Connector	3		PSTN	4.4.1g
8.	ISDN MUX Connector			ISDN	4.4.1h



PLACEMENT DETAILS OF SOURCE AND DESTINATION MODULE

FOR X=0, MARKER = ACITO

	MODULE-1	MODULE-2	MODULE-3
UNIT	AN-RAX	AN-RAX	CIT
FRAME	MASTER	SLAVE	-
SLOT	12A	12A	9A
7x2 POSITION	1	1	1
POLARISATION TAB TO RETAIN	1	1	1

FOR X=1, MARKER = ACIT1

	MODULE-1	MODULE-2	MODULE-3
UNIT	AN-RAX	AN-RAX	CIT
FRAME	MASTER	SLAVE	-
SLOT	15A	15A	10A
7x2 POSITION	1	1	1
POLARISATION TAB TO RETAIN	1	1	1

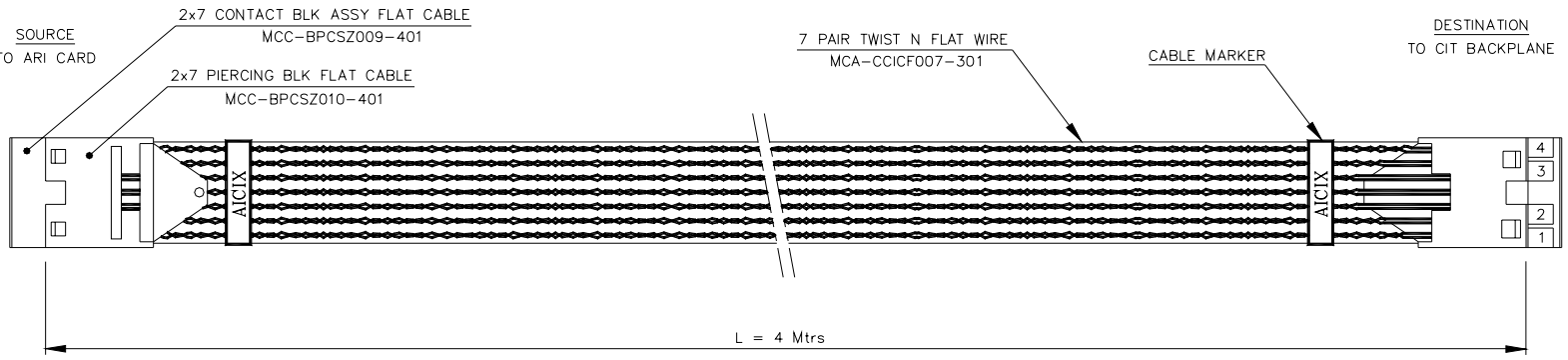
NOTE:

1. CABLE ASSY No. ACB-IANACITX-000 WHERE 'X' IS CABLE NUMBER 0 & 1.
2. CONDUCTORS FOR SOURCE AND DESTINATION-1 & DESTINATION-2 ARE 1:1.
3. THE 7 PAIR TWIST N FLAT WIRE SHOULD BE CRIMPED THROUGH MODULE-2 TO REACH MODULE-3 SUBSEQUENTLY.

FIG. 4.4.1.a

ARC TO ITI VOICE CABLE GENERAL ASSEMBLY

\DESIGN\ANRAX\ISDN-UM\ANRXISDN-VC



PLACEMENT DETAILS OF SOURCE AND DESTINATION MODULE

FOR X=0, MARKER = AIAC0

	SOURCE	DESTINATION
UNIT	AN-RAX	CIT
FRAME	SLAVE	–
SLOT	12A	J5
7x2 POSITION	2	1
POLARISATION TAB TO RETAIN	2	1

FOR X=1, MARKER = AIAC1

	SOURCE	DESTINATION
UNIT	AN-RAX	CIT
FRAME	SLAVE	–
SLOT	15A	J5
7x2 POSITION	2	3
POLARISATION TAB TO RETAIN	2	3

NOTE:

1, CABLE ASSY No. ACB-IANAICIX-000 WHERE 'X' IS CABLE NUMBER 0 & 1.

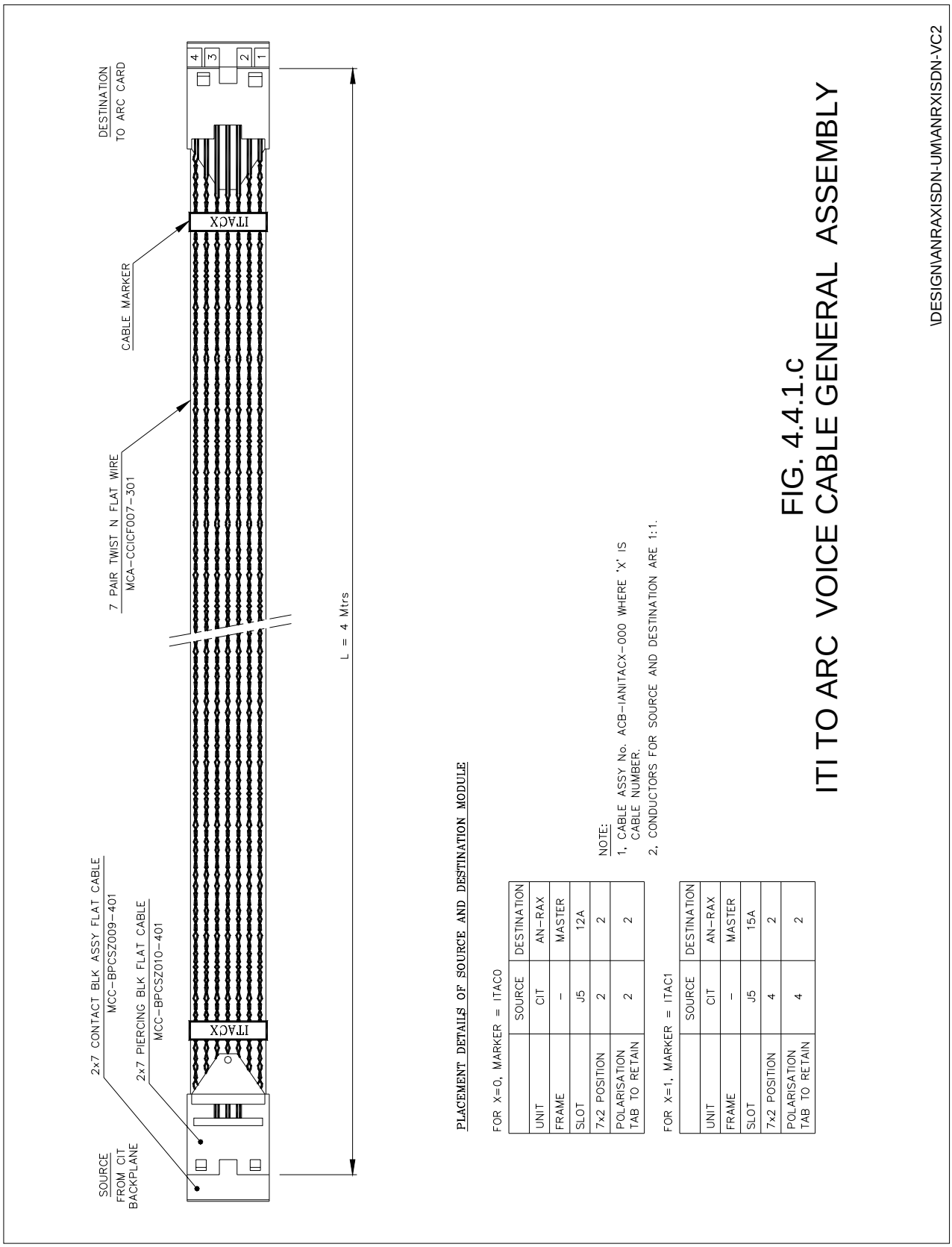
2, CONDUCTORS FOR SOURCE AND DESTINATION ARE 1:1.

TABLE – 2

SIGNAL NAME	SOURCE			DESTINATION		
	PIN No.	a	c	PIN No.	a	c
32A_D(4)	1	BLUE	WHITE	1	BLUE	WHITE
32A_D(5)	2	ORANGE	WHITE	2	ORANGE	WHITE
32A_D(6)	3	GREEN	WHITE	3	GREEN	WHITE
32A_D(7)	4	BROWN	WHITE	4	BROWN	WHITE
ARI_TCS~(2)	5	GREY	WHITE	5	GREY	WHITE
ARI_TCS~(3)	6	ORANGE	RED	6	ORANGE	RED
ARI_CP~	7	BLUE	RED	7	BLUE	RED

FIG. 4.4.1.b
ARI TO CIT VOICE CABLE GENERAL ASSEMBLY

\DESIGN\ANRAXISDN-UM\ANRXISDN-VC1



PLACEMENT DETAILS OF SOURCE AND DESTINATION MODULE

FOR X=0, MARKER = ITAC0

	SOURCE	DESTINATION
UNIT	CIT	AN-RAX
FRAME	-	MASTER
SLOT	J5	12A
7x2 POSITION	2	2
POLARISATION TAB TO RETAIN	2	2

FOR X=1, MARKER = ITAC1

	SOURCE	DESTINATION
UNIT	CIT	AN-RAX
FRAME	-	MASTER
SLOT	J5	15A
7x2 POSITION	4	2
POLARISATION TAB TO RETAIN	4	2

NOTE:
1. CABLE ASSY No. ACB-IANITACX-000 WHERE 'X' IS CABLE NUMBER.
2. CONDUCTORS FOR SOURCE AND DESTINATION ARE 1:1.

FIG. 4.4.1.c
ITI TO ARC VOICE CABLE GENERAL ASSEMBLY

\DESIGN\ANRAXISDN-UMANRXISDN-VC2

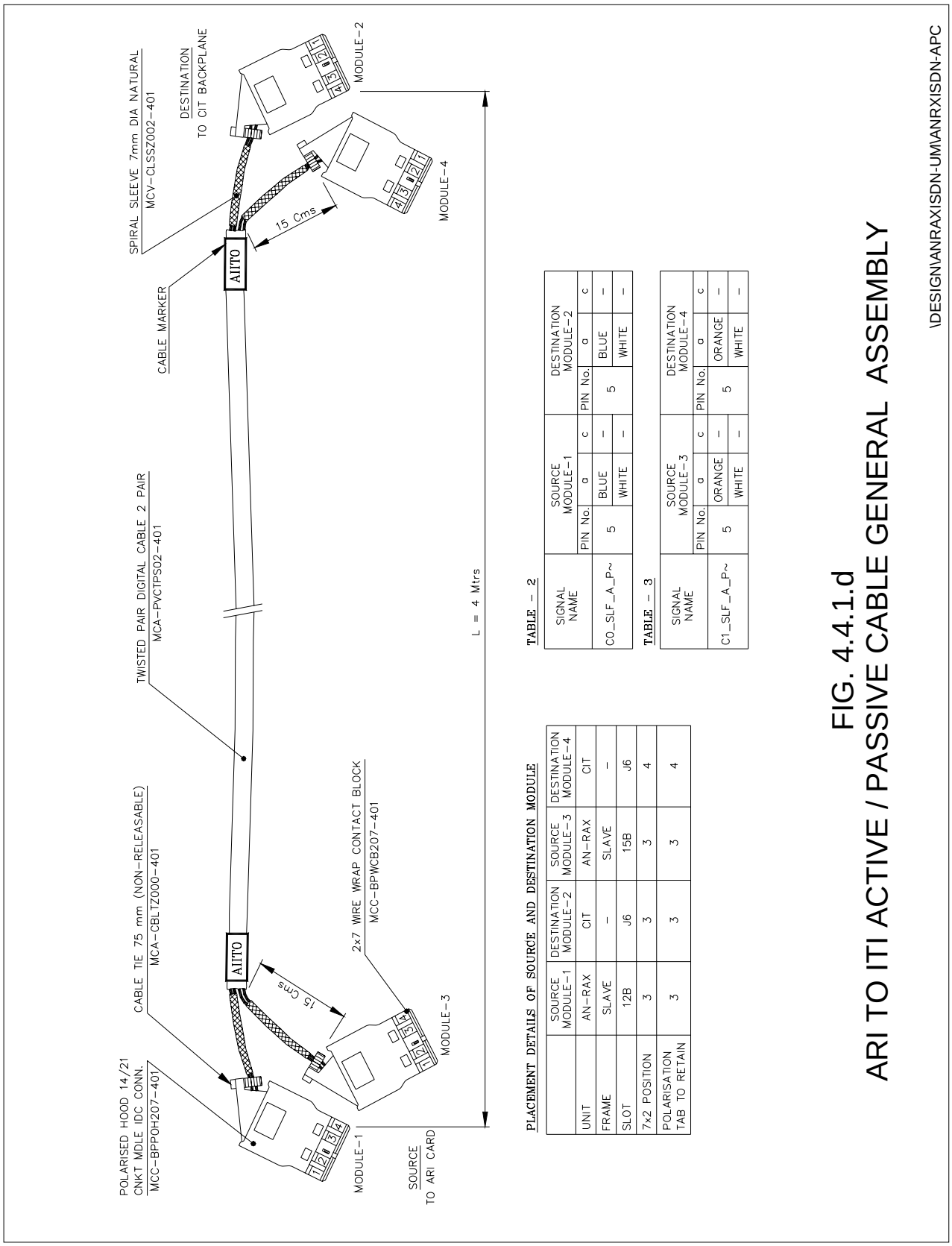


TABLE – 2

SIGNAL NAME	SOURCE MODULE-1			DESTINATION MODULE-2		
	PIN No.	a	c	PIN No.	a	c
CO_SLF_A_P~	5	BLUE	–	5	BLUE	–
		WHITE	–		WHITE	–

TABLE – 3

SIGNAL NAME	SOURCE MODULE-3			DESTINATION MODULE-4		
	PIN No.	a	c	PIN No.	a	c
C1_SLF_A_P~	5	ORANGE	–	5	ORANGE	–
		WHITE	–		WHITE	–

PLACEMENT DETAILS OF SOURCE AND DESTINATION MODULE

	SOURCE MODULE-1	DESTINATION MODULE-2	SOURCE MODULE-3	DESTINATION MODULE-4
UNIT	AN-RAX	CIT	AN-RAX	CIT
FRAME	SLAVE	–	SLAVE	–
SLOT	12B	J6	15B	J6
7x2 POSITION	3	3	3	4
POLARISATION TAB TO RETAIN	3	3	3	4

FIG. 4.4.1.d
ARI TO ITI ACTIVE / PASSIVE CABLE GENERAL ASSEMBLY

\DESIGN\ANRAX\ISDN-UMAN\RX\ISDN-APC

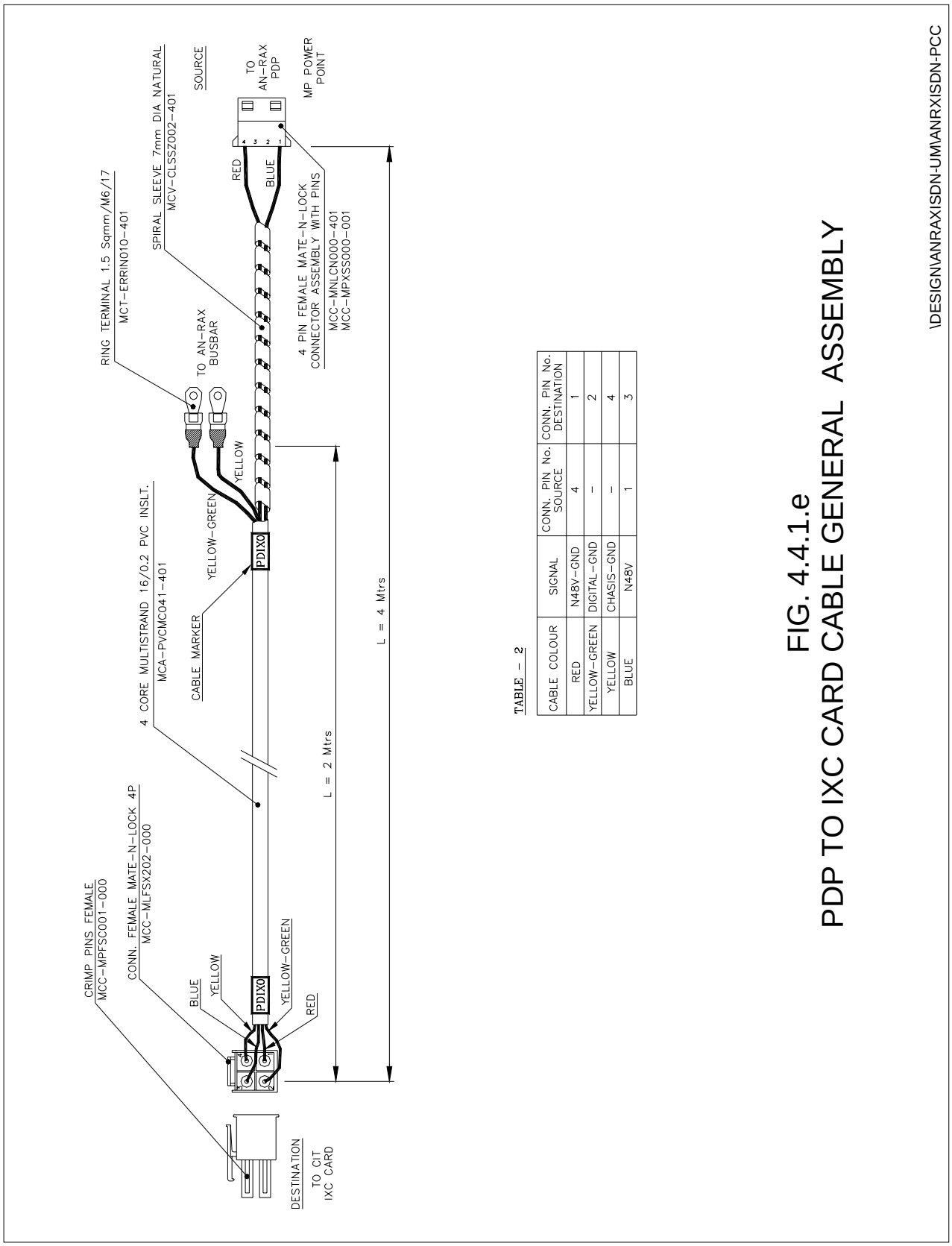


TABLE - 2

CABLE COLOUR	SIGNAL	CONN. PIN No. SOURCE	CONN. PIN No. DESTINATION
RED	N48V-GND	4	1
YELLOW-GREEN	DIGITAL-GND	-	2
YELLOW	CHASIS-GND	-	4
BLUE	N48V	1	3

FIG. 4.4.1.e
PDP TO IXC CARD CABLE GENERAL ASSEMBLY

\DESIGN\ANRAX\ISDN-UM\ANRXISDN-PCC

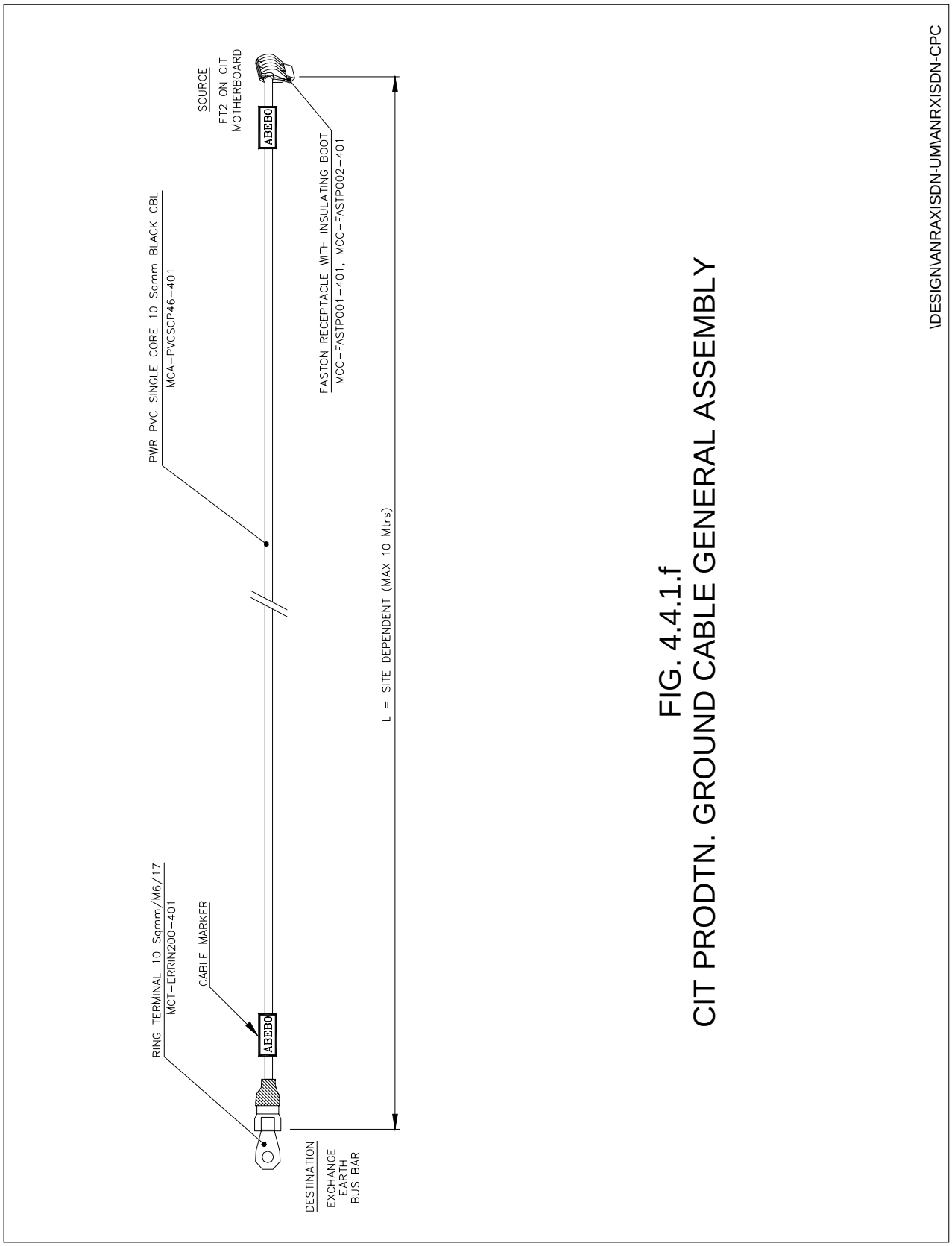


FIG. 4.4.1.f
CIT PRODTN. GROUND CABLE GENERAL ASSEMBLY

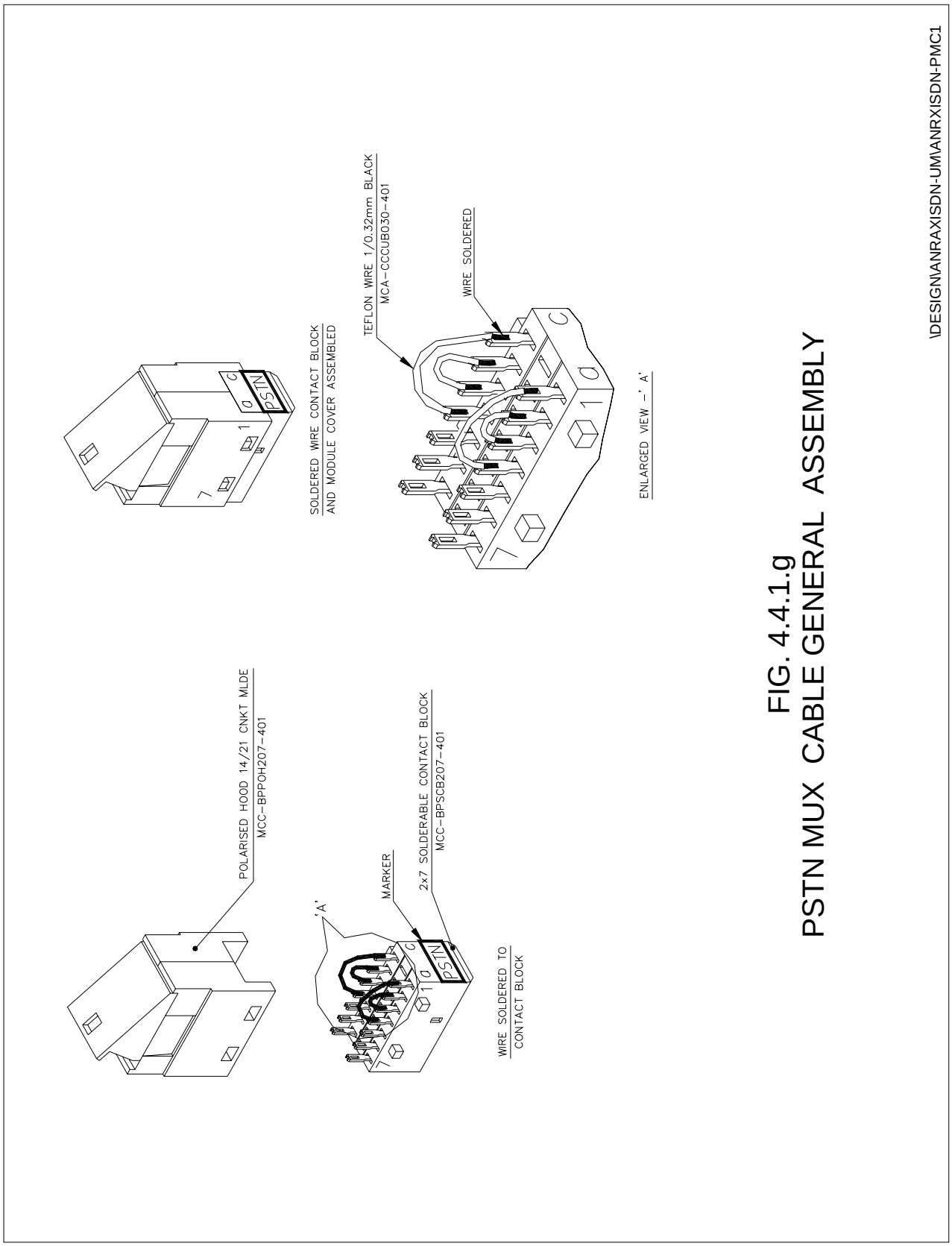


FIG. 4.4.1.g
PSTN MUX CABLE GENERAL ASSEMBLY

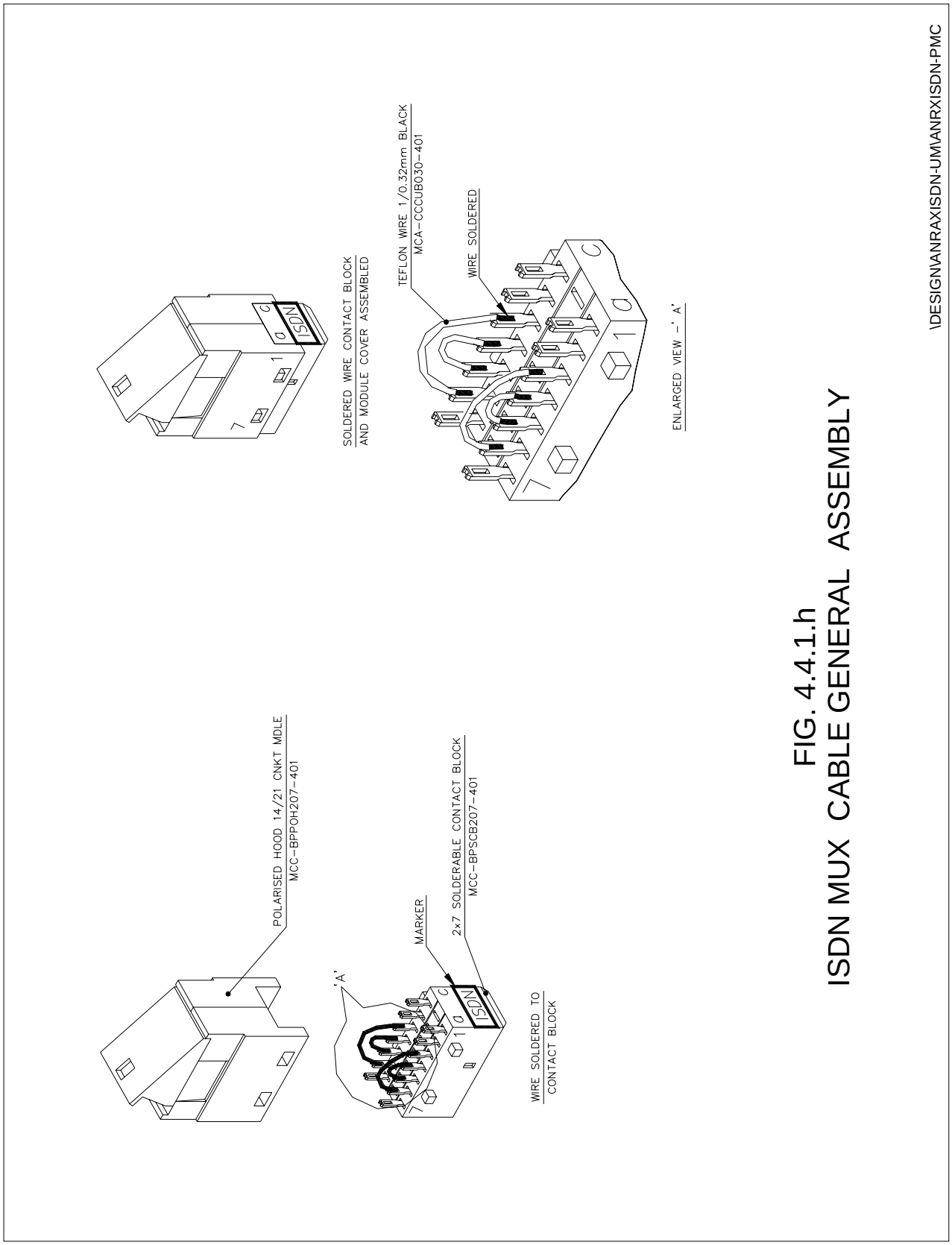
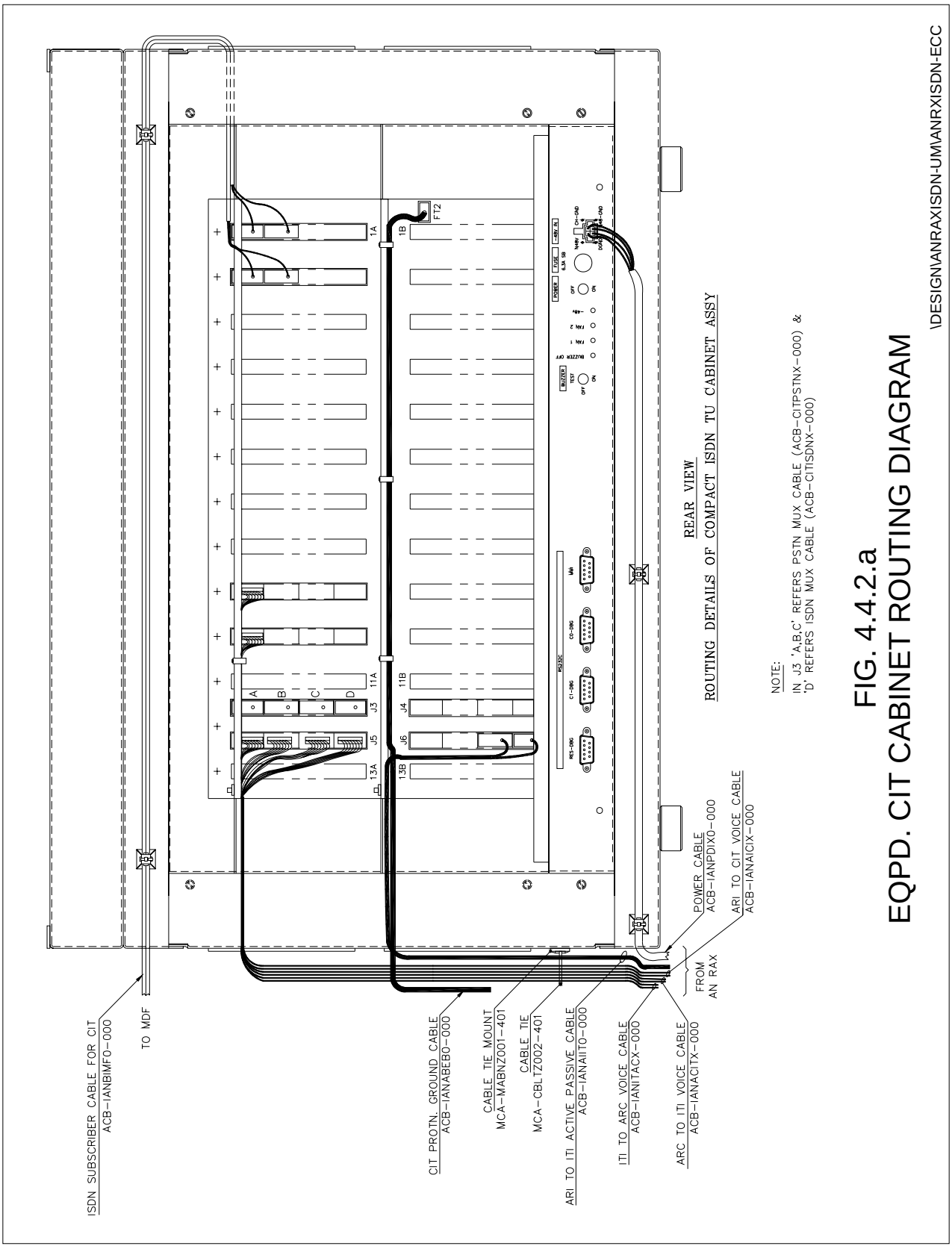


FIG. 4.4.1.h
ISDN MUX CABLE GENERAL ASSEMBLY

Table 4.4.2

SL NO	Part No	Description	Source Placement			Destination Placement			MARKER
			Back Plane	Slot NO	7 X 2 Location	Back Plane	Slot NO	7 X 2 Location	
1.	ACB-IANACITX-000	ARC to ITI voice cable	Master Frame (MOD1)	12A	1st	Slave frame (MOD2) CIT Back plane (MOD3)	12A 9A	1st 1st	ACIT0
2.	ACB-IANACITX-000		Master Frame (MOD1)	15A	1st	Slave frame (MOD2) CIT Back plane (MOD3)	15A 10A	1st 1st	ACIT1
3.	ACB-IANAICIX-000	ARI to CIT voice cable	Slave Frame (MOD1)	12A	2nd	CIT Back plane (MOD2)	J5	1st	AICI0
4.	ACB-IANAICIX-000		Slave Frame (MOD1)	15A	2nd	CIT Back plane (MOD2)	J5	3rd	AICI1
5.	ACB-IANAIITX-000	ARI to ITI Status cable	Slave Frame (MOD1)	12A	3rd	CIT Back plane (MOD2)	J6	3rd	AIITX
			Slave Frame (MOD3)	15A	3rd	CIT Back plane (MOD4)	J6	4th	A11T0

SL NO	Part No	Description	Source Placement			Destination Placement			MARKER
			Back Plane	**Slot NO**	**7 X 2 Location**	**Back Plane**	**Slot NO**	**7 X 2 Location**	
6.	ACB-IANITACX-000	ITI to ARC voice cable	CIT Back plane (MOD1)	J5	2nd	Master frame (MOD2)	12A	2nd	ITAC0
7.	ACB-IANITACX-000	ITI to ARC voice cable	CIT Back plane **(MOD1)**	J5	4th	Master frame **(MOD2)**	15A	2nd	ITAC1
8.	ACB-IANPDIX0-000	RAX PDP to CIT Power cable	RAX PDP (MP power point)	PDP	J1 (4 P relimate conn)	CIT Back plane **IXC face plate**	4 pin relimate conn	-48V in	PDIX
9.	ACB-IANABEB0-000	CIT Protection Ground Cable	CIT backplane	FT2	NA	EARTH BUS BAR	M6 screw point	NA	ABEB
10.	ACB-CITPSTNX-000	PSTN MUX connector	CIT back plane	J3	1st	CIT back plane	J3	1st	PSTN
11.	ACB-CITPSTNX-000	PSTN MUX connector	CIT back plane	J3	2nd	CIT back plane	J3	2nd	PSTN
12.	ACB-CITPSTNX-000	PSTN MUX connector	CIT back plane	J3	3rd	CIT back plane	J3	3rd	PSTN
13.	ACB-CITISDNX-000	ISDN MUX connector	CIT back plane	J3	4th	CIT back plane	J3	4th	ISDN


ISDN SUBSCRIBER CABLE FOR CIT
ACB-IANBIMF0-000
TO MDF
CIT PROTN. GROUND CABLE
ACB-IANABEB0-000
CABLE TIE MOUNT
MCA-MABNZ001-401
CABLE TIE
MCA-CBLTZ002-401
ARI TO ITI ACTIVE PASSIVE CABLE
ACB-IANAIIT0-000
ITI TO ARC VOICE CABLE
ACB-IANITAC*-000
ARC TO ITI VOICE CABLE
ACB-IANACTX-000
FROM
AN RAX
POWER CABLE
ACB-IANPDIX0-000
ARI TO CIT VOICE CABLE
ACB-IANAICIX-000
REAR VIEW
ROUTING DETAILS OF COMPACT ISDN TU CABINET ASSY
NOTE:
IN J3 'A,B,C' REFERS PSTN MUX CABLE (ACB-CITPSTNX-000) &
'D' REFERS ISDN MUX CABLE (ACB-CITSDNX-000)
FIG. 4.4.2.a
EQPD. CIT CABINET ROUTING DIAGRAM
\DESIGN\ANRAX\ISDN-UM\ANRXISDN-ECC

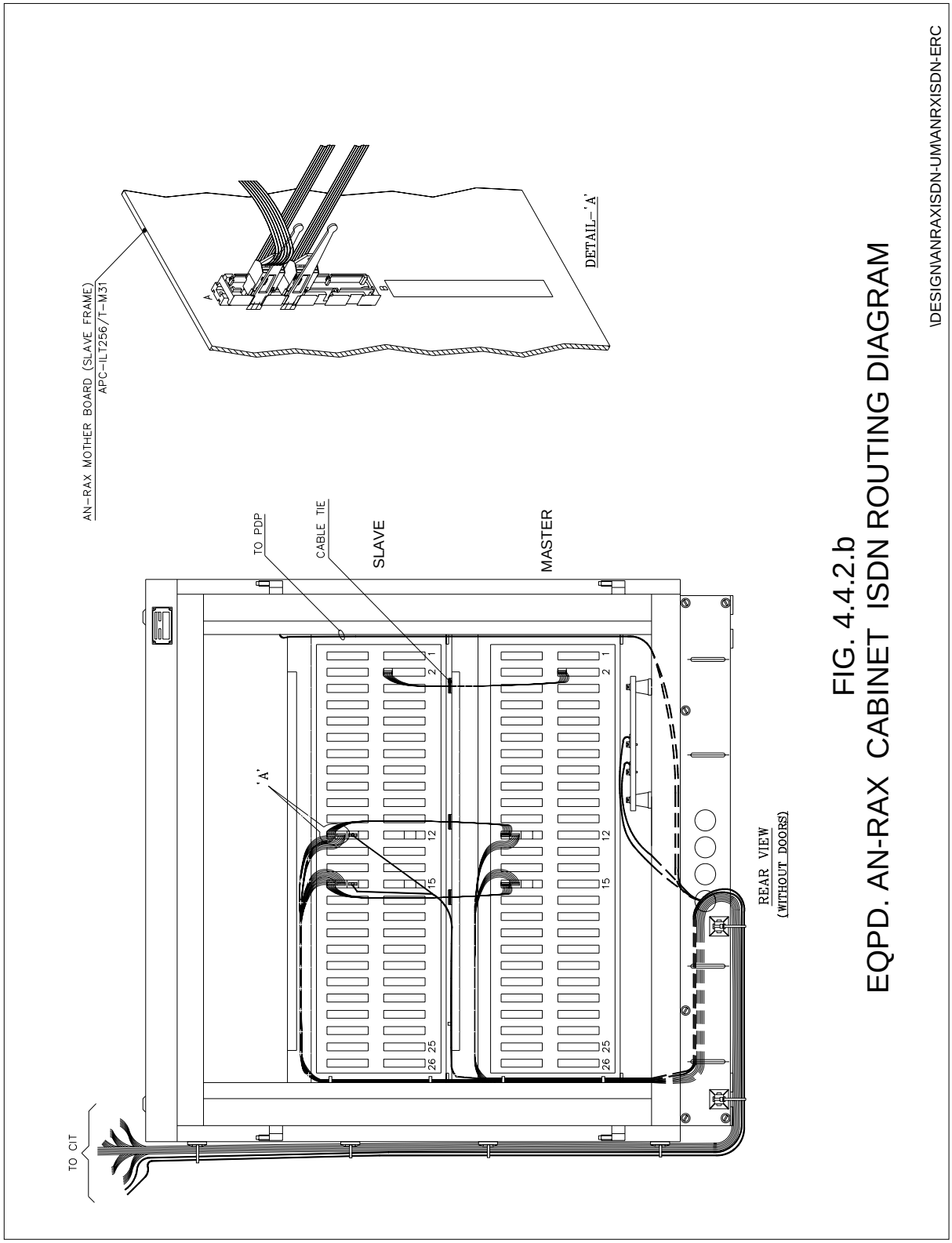


FIG. 4.4.2.b
EQPD. AN-RAX CABINET ISDN ROUTING DIAGRAM

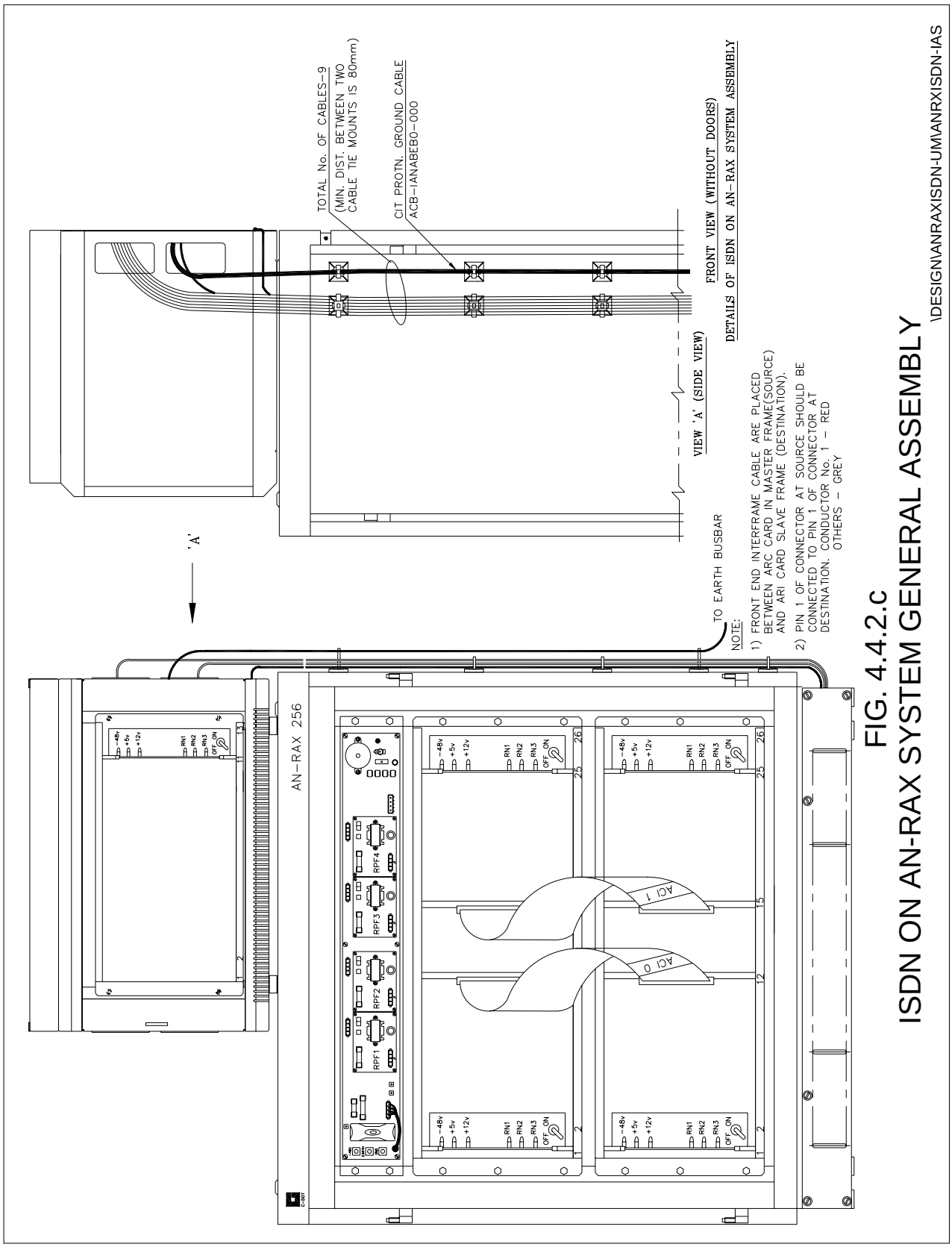

TOTAL No. OF CABLES-9
(MIN. DIST. BETWEEN TWO CABLE TIE MOUNTS IS 80mm)
CIT PROTN. GROUND CABLE
ACB-1ANABEB0-000
FRONT VIEW (WITHOUT DOORS)
DETAILS OF ISDN ON AN-RAX SYSTEM ASSEMBLY
VIEW 'A' (SIDE VIEW)
'A'
TO EARTH BUSBAR
NOTE:
1) FRONT END INTERFRAME CABLE ARE PLACED BETWEEN ARC CARD IN MASTER FRAME(SOURCE) AND ARI CARD SLAVE FRAME (DESTINATION).
2) PIN 1 OF CONNECTOR AT SOURCE SHOULD BE CONNECTED TO PIN 1 OF CONNECTOR AT DESTINATION. CONDUCTOR No. 1 - RED
OTHERS - GREY
AN-RAX 256
ACI 1
ACI 0
\DESIGN\ANRAX\ISDN-UMAN\RXISDN-IAS

FIG. 4.4.2.c
ISDN ON AN-RAX SYSTEM GENERAL ASSEMBLY

Chapter 5.

Man-Machine Interface (MMI) and Alarm Monitoring

5.1. DESCRIPTION OF NEW PARAMETERS

This section contains the details of parameters that are need for the administration of ISDN subscribers (also valid for PSTN mode) at ANRAX.

5.1.1. CARD TYPE

PARAMETER NAME	:	Type of Card
MNEMONIC	:	CARD TYPE
DEFINITION	:	It defines the Hardware Type of Termination cards actually placed in the slot.
TYPE	:	Alphanumeric
POSSIBLE VALUES	:	lcc - Line Circuit Card
		ccb - Coin Collection Box line card
		rtc - RAX Terminal tester Card
		brl - Basic Rate Line card
DEFAULT	:	LCC
REMARKS	:	rtc can be equipped only in slot 8 of master frame brl can equip only in ISDN+PSTN mode.

5.1.2. EF ADDRESS

PARAMETER NAME	:	Envelop function Address
MNEMONIC	:	EF ADDRESS
DEFINITION	:	It defines the ISDN User Port.
TYPE	:	Numeric
POSSIBLE VALUES	:	STL3+224 TO STL3+231 and STL3+240 to STL3+247 STL3 = START LE Address
DEFAULT	:	Start EF Address = Start L3 addr + 224
REMARKS	:	

5.1.3. FRAME

PARAMETER NAME	:	Frame Number
MNEMONIC	:	FRAME
DEFINITION	:	It defines the Frame Number.
TYPE	:	Numeric
POSSIBLE VALUES	:	1 - for Master Frame 2 - for Slave Frame 3 - ISDN Unit
DEFAULT	:	
REMARKS	:	

5.1.4. SLOT

PARAMETER NAME	:	Card Slot Numbers
MNEMONIC	:	SLOT
DEFINITION	:	It defines the physical slot of terminal card.
TYPE	:	Numeric
POSSIBLE VALUES	:	03 to 10, 17 to 24 for Master & Slave 01 to 02 for ISDN Unit
DEFAULT	:	In default ISDN slot are not equipped.
REMARKS	:	

5.1.5. STARTING EF ADDRESS

PARAMETER NAME	:	Starting EF Address
MNEMONIC	:	STARTING EF ADDR
DEFINITION	:	Identifies the start EF address and starts from start EF Address +224
TYPE	:	Numeric
POSSIBLE VALUES	:	Start L3 Addr + 224
DEFAULT	:	None
REMARKS	:	

5.1.6. SYSTEM MODE

PARAMETER NAME : System Mode

MNEMONIC : SYSTEM MODE

DEFINITION : To change the working mode of ANRAX

TYPE : Numeric

POSSIBLE VALUES : 1 for PSTN only

2 for ISDN + PSTN

DEFAULT : 1

REMARKS :

5.1.7. UNIT ID

PARAMETER NAME : Unit Identification

MNEMONIC : UNIT ID

DEFINITION : Identification of the unit for which alarm is to be displayed.

TYPE : Alphanumeric

POSSIBLE VALUES : Additional possible values are

brl_1
brl_2
ITI1 - ISDN Terminal Interface card
ITI2 -

DEFAULT : None

REMARKS :

5.2. DESCRIPTION OF ISDN RELATED COMMANDS FOR ANRAX

5.2.1. mod-sys-mode (MODIFY THE SYSTEM MODE)

Description :

This command is used to change the working mode of ANRAX. First mode is PSTN (which is also the default mode of ANRAX) only and second mode is PSTN+ISDN.

INPUT FORM :

```
C-DOT ANRAX                                              <site-id>

    MOD-SYS-MODE                                  Change System Mode

    Existing Values :

    System Mode          :       1 (for PSTN only)

    Modified Values

    System Mode          :       2 (for PSTN + ISDN)
```

OUTPUT FORM :

```
C-DOT ANRAX                                              <site-id>

    MOD-SYS-MODE                                  Change System Mode

    RESULT       :       SUCCESSFUL
```

5.2.2. equip-slot (EQUIP A SLOT)

Description :

This command is used to configure a physical slot for a particular card type in ISDN unit.

INPUT FORM :

```
C-DOT ANRAX                                              <site-id>

    EQUIP-SLOT                          Equip the card in the Slot

    FRAME       :       3

    SLOT        :       1

    CARD TYPE   :       brl
```

OUTPUT FORM :

```
C-DOT ANRAX                                              <site-id>

    EQUIP-SLOT                          Equip the card in the Slot

    FRAME       :       3

    SLOT        :       1

    RESULT      :       SUCCESSFUL
```

5.2.3. unequip-slot (UNEQUIP A SLOT)

Description :

This command is used to unequip a physical slot.

INPUT FORM :

```
C-DOT ANRAX                                              <site-id>

    UNEQUIP-SLOT                        Unequip the card from the Slot

    FRAME       :       3

    SLOT        :       1
```

OUTPUT FORM :

```
C-DOT ANRAX                                              <site-id>

    UNEQUIP-SLOT                        Unequip the card from the Slot

    FRAME       :       3

    SLOT        :       1

    RESULT      :       SUCCESSFUL
```

Note : *The Result may be fail due to reasons "SLOT IS NOT EQUIPPED", "INVALID FRAME" OR "INVALID SLOT or "PORTS ARE INS".*

5.2.4. displ-slot (DISPLAY THE SLOT)

Description :

This command gives the type of card and status of card present in the specified slot.

INPUT FORM :

```
C-DOT ANRAX                                              <site-id>

    DISPL-SLOT                                  Display card Slot Data

    FRAME       :       3

    SLOT        :       1 or 2
```

OUTPUT FORM :

```
C-DOT ANRAX                                              <site-id>

    DISPL-SLOT                                  Display card Slot Data

    FRAME       :       3

    SLOT        :       1 or 2

    CARD TYPE   :       brl

    STATUS      :       IS
```

Failure Reasons :

1. Invalid Frame
2. Invalid Slot

5.2.5. displ-ai-char (DISPLAY AI CHARACTERISTICS)

Description :

This command can be used to display the AN interface characteristics.

INPUT FORM :

None

OUTPUT FORM :

```
C-DOT ANRAX                                                    <site-id>

    DISPL-AI-CHAR                          Display An Interface Characteristics

    V5 Interface ID          :      1
    V5 Interface Name        :      ANRAX
    Variant ID               :      1
    Stating L3 Addr          :      1
    Stating EF Addr          :      225
    Link Configuration       :      0-0 & 1-1
    Primary Link             :      0
    Secondary Link           :      1
```

5.2.6. frc-trm-oos (FORCE TERMINAL OUT OF SERVICE)

Description :

This command will be used to put AN interface subscribers out of service forcefully.

INPUT FORM :

C-DOT ANRAX		**<site-id>**
FRC-TRM-OOS		**Force Terminal Out of Service**
L3 Address	:	Start L3 Addr + 224 (For ISDN subscriber)
	Note*	

Note : *Range of L3 Address can be given.*

OUTPUT FORM :

C-DOT ANRAX		**<site-id>**
FRC-TRM-OOS		**Force Terminal Out of Service**
L3 Address	:	
Response	:	Success/Failure

Failure Reasons :

1. Invalid L3 address
2. Port is unequipped
3. Port is already out of service.

5.2.7. put-trm-oos (PUT TERMINAL OUT OF SERVICE)

Description :

This command is used to put AN subscribers out of service.

INPUT FORM :

C-DOT ANRAX		**<site-id>**
PUT-TRM-OOS		**Put Terminal Out of Service**
L3 Address	:	Start L3 Addr + 224 (For ISDN subscriber)
	Note*	

Note : *Range of L3 Address can be given.*

OUTPUT FORM :

C-DOT ANRAX		**<site-id>**
PUT-TRM-OOS		**Put Terminal Out of Service**
L3 Address	:	
Response	:	Success/Failure

Failure Reasons :

1. Invalid L3 address
2. Port is busy
3. Port is unequipped
4. Interface is down.
5. Command execution timed out.

5.2.8. frc-trm-ins (FORCE TERMINAL IN SERVICE)

Description :

This command is used for bringing the terminals in-service without testing them.

INPUT FORM :

```
C-DOT ANRAX                                                    <site-id>

    FRC-TRM-INS                                  Force Terminal In Service

    L3 Address      :       Start L3 Addr + 224 (For ISDN subscribers)
```

OUTPUT FORM :

```
C-DOT ANRAX                                                    <site-id>

    FRC-TRM-INS                                  Force Terminal In Service

        L3 Address      :

        Response        :       Success/Failure
```

Failure Reasons :

1. Invalid L3 address
2. Port is unequipped
3. Interface down
4. No Response form LE.

5.2.9. put-trm-ins (PUT TERMINAL IN SERVICE)

Description :

This command is used to put AN subscribers in service, after testing the port.

INPUT FORM :

```
C-DOT ANRAX                                                    <site-id>

    PUT-TRM-INS                                  Put Terminal In Service

    L3 Address      :       Start L3 Addr + 224 (For ISDN subscribers)
```

OUTPUT FORM :

```
C-DOT ANRAX                                                    <site-id>

    PUT-TRM-INS                                  Put Terminal In Service

        L3 Address      :

        Response        :       Success/Failure
```

Failure Reasons :

1. Invalid L3 address
2. Port is unequipped
3. Interface down
4. Exchange side test failed
5. Time out no Response form LE.

5.2.10. displ-trm-status (DISPLAY TERMINAL STATUS)

Description :

This command will display the port status for on AN Interface.

INPUT FORM :

```
C-DOT ANRAX                                              <site-id>

    DISPL-TRM-STATUS                          Display Terminal Status

    L3 Address      :       Start L3 Addr + 224 (For ISDN subscribers)
```

OUTPUT FORM :

```
C-DOT ANRAX                                              <site-id>

    DISPL-TRM-STATUS                          Display Terminal Status

        L3 Address          Status
            1                 IS
            2                 IS
            .                 .
            .                 .
            .                 .
```

Failure Reasons :

1. Invalid L3 address

5.2.11. displ-aicnt-oos (DISPLAY AI PORTS OUT OF SERVICE)

Description :

This command gives number of ports under various status.

INPUT FORM :

None.

OUTPUT FORM :

C-DOT ANRAX **<site-id>**

DISPL-AICNT-OOS **Display AI Ports Out Of Service**

INS PORTS	OOS PORTS	BLK PORTS	UEQ PORTS	FOOS PORTS	MTCE PORTS
224	8	0	16	8	0

Failure Reasons :

1. Invalid L3 address

5.2.12. displ-alrm-hist (DISPLAY ALARM HISTORY)

Description :

This command is used to display the history of alarms that are occurred in the system over a span of time.

INPUT FORM :

```
C-DOT ANRAX                                                    <site-id>

    DISPL-ALRM-HIST                                  Display Alarm History

    Unit ID      :    brl1
```

OUTPUT FORM :

```
C-DOT ANRAX                                                    <site-id>

    DISPL-ALRM-HIST                                  Display Alarm History

                          Alarm History of the Unit : brl1

DATE          TIME OCCURRED          STATUS        SEVERITY

01/01/2004    19:54:58                 IS          MAJOR

01/01/2004    19:52:00                 OOS         MAJOR
```

The status Indication and Alarms Display Panel.

The card health of BRL, ITI and the EPU is displayed in the last 2 columns in the last 2 columns in the2nd frame of status display panel of ANRAX.

The MMI panel shows the stauts of 2 BRL cards as unequipped (UEQ), in-service (OK) or jaked out (JO).

The MMI panel shows the status of EPU card as PSU error PSUER), in-service (OK) or battery low (BATLO).

The MMI panel shows the status of 2ITI cards as in service (OK), out of service (OK), out of service (FAIL) or forced out of service (FOOS).

The alarms for the new units are flashed as is being done for the other units.

```
C-DOT ANRAX                                                    <site-id>

 S01  psu  ok     S08  rteloc  ok     S16  spc  ok     S22  ---  ueq
 S03  lcc  ok     S09  lcc  ok        S16  lcc  ok     S23  ---  ueq     I01  brl  ok
 S04  lcc  ok     S010  lcc  ok       S16  lcc  ok     S24  ---  ueq     I02  brl  ok
 S05  lcc  ok     S011  spc  ok       S16  lcc  ok     S25  psu  ueq     I09  ITI  ok
 S06  lcc  ok     S012  ari  ok       S16  lcc  ok                       I10  ITI  FOOS
 S07  lcc  ok     S015  ari  ok       S16  lcc  ok                       I13  epu  ok




NORMAL MODE     01/01/2004,   Thursday  09:35:41       MORE STATUS : # HELP : ?
```